

2009-1029
(Serial No. 09/877,159)

**United States Court of Appeals
For the Federal Circuit**

IN RE DAVID M. BAGGETT

Appeal from the United States Patent
and Trademark Office,
Board of Patent Appeals and Interferences.

**BRIEF FOR APPELLANT
DAVID M. BAGGETT**

**Denis G. Maloney
Thomas A. Brown (*of counsel*)
Tonya Drake (*of counsel*)
FISH & RICHARDSON P.C.
225 Franklin Street
Boston, MA 02110
Telephone: (617) 542-5070
Facsimile: (617) 542-8906**

***Attorneys for Appellant
David M. Baggett***

CERTIFICATE OF INTEREST

Counsel for Appellant David M. Baggett certifies the following (use "None" if applicable):

1. The full name of every party or amicus represented by me is:

David M. Baggett

2. The name of the real party in interest (if the party named in the caption is not the real party in interest) represented by me is:

ITA Software, Inc.

3. All parent corporations and any publicly held companies that own 10 percent or more of the stock of the party or amicus curiae represented by me are:

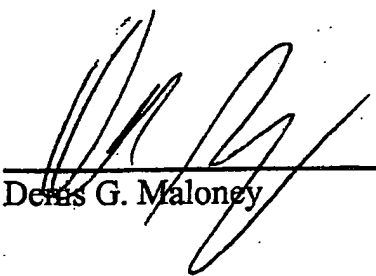
none

4. ☒ There is no such corporation as listed in paragraph 3.

5. The names of all law firms and the partners or associates that appeared for the party or amicus now represented by me in the trial court or agency or are expected to appear in this court are:

**Fish & Richardson P.C., Denis G. Maloney, Thomas A. Brown,
and Tonya S. Drake.**

12/17/08
Date



Denis G. Maloney

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I. STATEMENT OF RELATED CASES

No other appeal in or from the same proceeding in the Patent and Trademark Office has previously been before this or any other appellate court under the same or similar title.

Appellant David M. Baggett (“Mr. Baggett” or “Appellant”) is not aware of any case pending in this or any other court that will directly affect, or be directly affected by, this Court’s decision in the pending appeal.

II. JURISDICTIONAL STATEMENT

The United States Patent and Trademark Office (the “PTO”) examined the patent application at issue in this appeal pursuant to the jurisdiction granted by 35 U.S.C. §§ 2(a)(1) and 6(b).

On October 11, 2005, the patent examiner rejected all pending claims. On March 10, 2008, the Board of Patent Appeals and Interferences (the “Board”) issued a decision affirming-in-part the patent examiner’s rejection of some of the pending claims and entered a new rejection of another set of the pending claims. On May 5, 2008, Mr. Baggett filed a petition for reconsideration. On July 10, 2008, the Board issued a final order reaffirming the rejection of all but one pending claim. On September 9, 2008, Mr. Baggett timely filed a notice of appeal to this Court.

This Court has jurisdiction over this appeal pursuant to 35 U.S.C.

§ 141.

III. STATEMENT OF THE ISSUES

Every pending claim in the present application includes a limitation that requires a determination of interior cities that appear with gateway cities in arbitraries. This determination is one of the central novel features of the claimed invention. The specification is clear that this determination requires finding those “interior cities” that *actually appear* with gateway cities in arbitraries. The Board of Patent Appeals and Interferences, however, ignored the disclosure of the specification and held that this determination was satisfied by prior art that indisputably does not disclose or suggest this feature. As a result, this Court should reverse the rulings of the Board and remand this application with instructions to allow all pending claims.

This appeal raises the following issues:

1. Whether the Board of Patent Appeals and Interferences erred in finding the pending claims obvious, where the Board’s analysis eviscerated the step of determining interior cities from the claims by conflating the separately-recited steps of “determining interior cities that appear with gateway cities in arbitraries” and “applying an arbitrary.”

2. Whether the Board erred in finding that the use of a hash table would have been obvious without citing any evidence in support of its findings.

3. Whether the Board, after acknowledging that the prior art neither disclosed nor suggested "memoization," erred by failing to allow claims reciting memoization.

IV. STATEMENT OF THE CASE

This appeal arises from the examination of a patent application filed by Mr. Baggett during which, over the course of four office actions and an appeal to the Board of Patent Appeals and Interferences, the PTO failed to identify any references that disclose or suggest "preprocessing by: determining interior cities that appear with gateway cities in arbitraries." (A21-25.)

Mr. Baggett filed his patent application on June 8, 2001. Three office actions and responses, not at issue in this appeal, followed. On October 11, 2005, citing Gardner (U.S. Patent Pub. No. 2002/0178034), the ATPCO Manual, and the applicant's admitted prior art, the examiner rejected all pending claims under 35 U.S.C. § 103(a). (A572-73.)

None of the art cited by the examiner disclosed a preprocessing by “determining interior cities that appear with gateway cities in arbitraries,” as recited in every pending claim.

Mr. Baggett appealed to the Board on February 21, 2006. (A591.) On March 10, 2008, the Board issued a decision affirming the patent examiner’s rejection of pending claims 1, 7, 8, 10-20, 22, and 28-41 and reversed as to claims 2-6, 21, 23-27, 42, and 52-55 but entered a new rejection against those claims. (A10-33.)

The Board held that the “determining interior cities that appear with gateway cities in arbitraries” step was inherent in the prior art’s disclosure of “applying an arbitrary.” The Board did not address the fact that the specification describes “determining interior cities that appear with gateway cities in arbitraries” as involving a very different process and function from simply “applying an arbitrary” as disclosed in the prior art. The Board also did not address the fact that the claims explicitly recite “applying an arbitrary” as a *separate step* from “determining interior cities that appear with gateway cities in arbitraries.”

Mr. Baggett filed a petition for reconsideration. On reconsideration, the Board reversed its affirmance with respect to claim 9, which required “memoization.” (A7.) The Board acknowledged that it had misread the

claim to require “memorization,” and held that none of the cited art disclosed or suggested the claimed “memoization.” (A7.)

The Board did not reverse its decision on claims 20, 29, or 41, all of which also require memoization. (A8.) Nor did the Board reverse its decision on the other claims, or explain how “determining interior cities that appear with gateway cities in arbitraries” could be inherent in “applying an arbitrary” when the two steps were separately described and claimed.

On September 9, 2008, Mr. Baggett timely appealed to this Court.

V. STATEMENT OF FACTS

A. Introduction to Fare Construction

Two types of fares exist in the air travel industry: “published fares” and “constructed fares.” A “published fare” is an airline’s stated fare for travel between two cities (a “market”). (A100.) Too many markets exist, however, for airlines to publish fares for every market. (*Id.*) This is particularly a problem for international travel originating at or arriving at a small market. For example, a given airline may not publish a fare for the small OME-NCE (Nome, Alaska/Nice, France) market. (*Id.*) Nevertheless, airlines must be able to charge some price for travel between Nome, Alaska and Nice, France. (*Id.*)

To address this issue, airlines have developed a type of fare known as a "constructed fare" (also known as an "unpublished fare"). A constructed fare begins with a published fare, and extends the published fare using "add-ons" (also called "arbitraries") in order to derive prices for travel involving minor cities. (A100.) An "arbitrary" is an ordered pair of cities and the additional fare required for travel between those cities. (*Id.*) One city in the arbitrary is known as an "interior city," and represents the minor city where travel will originate or terminate. The other city in the pair is known as a "gateway city," and represents the larger city for which a published fare exists. (*Id.*)

There are several types of constructed fares. One type is a constructed fare that has an arbitrary plus a published fare. (A100.) For example, a constructed fare for travel from Nome, Alaska to Paris, France might be represented as OME-JFK-CDG. JFK-PAR, representing travel from JFK airport to Charles De Gaulle airport, is a published fare. OME-JFK, representing travel from Nome, Alaska to JFK airport, is an arbitrary. (A100-01.)

A second type of constructed fare has a published fare plus an arbitrary. For example, a constructed fare from New York to Nice, France

might be represented as JFK-CDG-NCE, where JFK-CDG is a published fare and CDG-NCE is an arbitrary. (A100-01.)

A third type of constructed fare has an arbitrary plus a published fare plus another an arbitrary. Thus, travel from Nome, Alaska to Nice, France might be represented as OME-JFK-CDG-NCE, where OME-JFK and CDG-NCE are arbitraries, and JFK-CDG is a published fare. (A101.)

B. Fare Construction: an Inefficient Approach

Producing a list of all possible constructed fares is not a straightforward exercise. One inefficient approach is described by the pseudocode below:

```
loop: for each airline a,  
  loop: for each city, c1  
    loop: for each city, c2  
      loop: for each city, c3, try to construct fares for airline a, c1-  
        c2-c3  
        loop: for each city, c4, try to construct fares for airline a, c1-  
          c2-c3-c4
```

(A105.)

This approach proceeds as follows: Iterate through every possible airline *a*. For each airline *a*, iterate through every possible city with an airport *c1*. For each city *c1*, again iterate through every possible city with an airport *c2*. For each city *c2*, again iterate through every possible city with an airport *c3*. For each city *c3*, see if a fare can be constructed for airline *a* from *c1* to *c2* and from *c2* to *c3*. If so, add the constructed fare to a list.

Finally, for each city *c3*, iterate again through all possible cities with an airport *c4*. For each city *c4*, see if a fare can be constructed for airline *a* from *c1* to *c2*, from *c2* to *c3*, and from *c3* to *c4*. If so, add the constructed fare to the list. (*Id.*)

This approach is too slow for many real-world tasks. As the specification notes, if there were only 1000 cities with airports, then this process would require one trillion determinations. (A105-06.) Moreover, as the number of cities with airports increases, the amount of time required by this algorithm increases exponentially.

C. Fare Construction: a Novel Approach¹

Mr. Baggett sought a better solution. Mr. Baggett recognized that the solution described above is inefficient, in part, because very few cities actually appear in arbitraries for a given airline. (A108.) In other words, a given airline only serves a limited number of interior cities, and only uses a limited number of gateway cities.

With this insight, Mr. Baggett recognized that, rather than attempting to produce a list of constructed fares in one step, efficiency could be improved by first pre-processing to determine which cities are actually present in arbitraries for a given airline. Once the cities that actually appear

¹ This section summarizes a preferred embodiment as described in the specification. This description is not intended to limit the claim scope.

in arbitraries are determined, the fare construction process can attempt to construct fares by considering only the determined cities.

The pre-processing described in the specification includes four steps, which are performed airline-by-airline. That is, the system assumes that a particular airline is to be used, and follows each of these steps until all fares for that airline are constructed.

In the critical first step, the system determines which interior cities actually appear in arbitraries for the particular airline. According to the specification, the process first “retrieves 44 an interior city from a list of interior cities ‘C1’ that are part of an arbitrary for the airline ‘A.’” (A109.) A hash table² used by this step might have the following structure, with each row representing an arbitrary:

<u>Airline, Interior City</u>	<u>Gateway City</u>
A, OME	JFK
A, OME	SFO
A, NCE	CDG

Thus, as a result of the first step, *only those interior cities that appear in the table with a particular airline* need be considered. This step reflects Mr. Baggett’s insight that, because very few cities actually appear in arbitraries

² A hash table is a data structure that allows for retrieval of information in so-called “constant time,” meaning that the time required to retrieve information from a hash table does not vary based on the size of the table. (See A106.)

for a given airline, efficiency could be improved by considering only those interior cities that actually appear with a given airline in arbitraries.

In the second step, for each interior city C1 that was determined by the previous step, the system looks up the corresponding gateway city. This information is retrieved from the same hash table such as the one illustrated above. (See A109.) This table allows the system, by specifying the airline and interior city, to retrieve the gateway cities for which the airline provides arbitraries with the interior city. The specification depicts this functionality as follows:

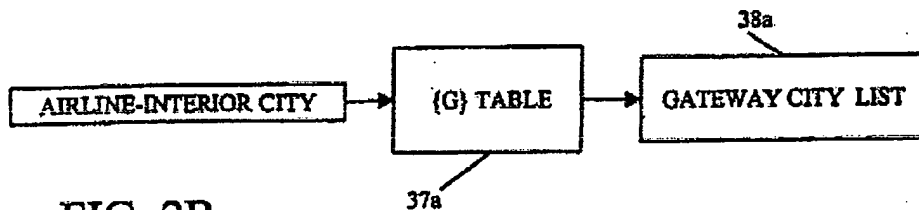


FIG. 2B

(A130.)

The third pre-processing step follows from the second. In the third step, the system determines which gateway cities actually appear in published fares with those gateway cities found in the first hash table for a given airline. (A109.) The specification discusses retrieving this information from a second previously-produced hash table indexed by airline and gateway city, returning a list of gateway cities. (*Id.*) For example:

<u>Airline, Gateway City</u>	<u>Gateway Cities</u>
A, JFK	CDG, SFO
A, CDG	JFK

Using this hash table, the system can determine, given an airline and a gateway city, what other gateway cities can be used to generate a published fare. (A109.) The functionality provided by this hash table is depicted as follows:

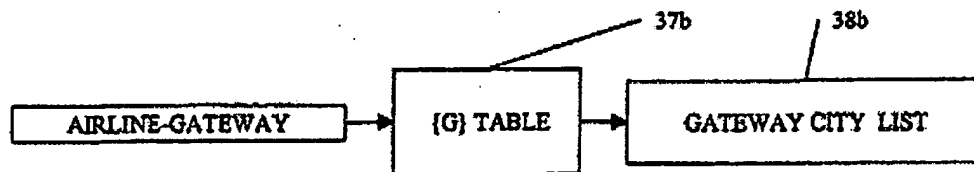


FIG. 2C

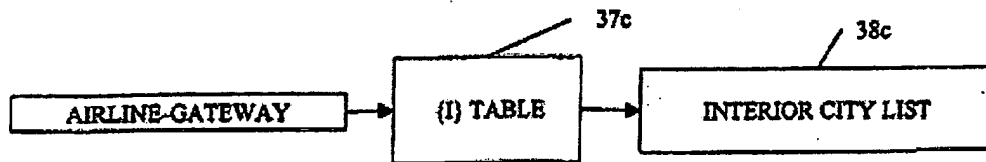
(A130.)

The fourth pre-processing step again follows from the previous step. In the fourth step, the system determines which interior cities appear in arbitraries with the gateway cities from the second hash table for a given airline. (A109.) Again, the specification discusses retrieving this information from a hash table, this one indexed by airline and gateway city, returning an interior city. (*Id.*) For example:

<u>Airline, Gateway City</u>	<u>Interior Cities</u>
A, JFK	OME, ROC
A, CDG	NCE

Using this third hash table, the system can determine, given an airline and an interior city, what other gateway cities can be used to generate a

published fare. (A109.) The functionality provided by this hash table is depicted as follows:



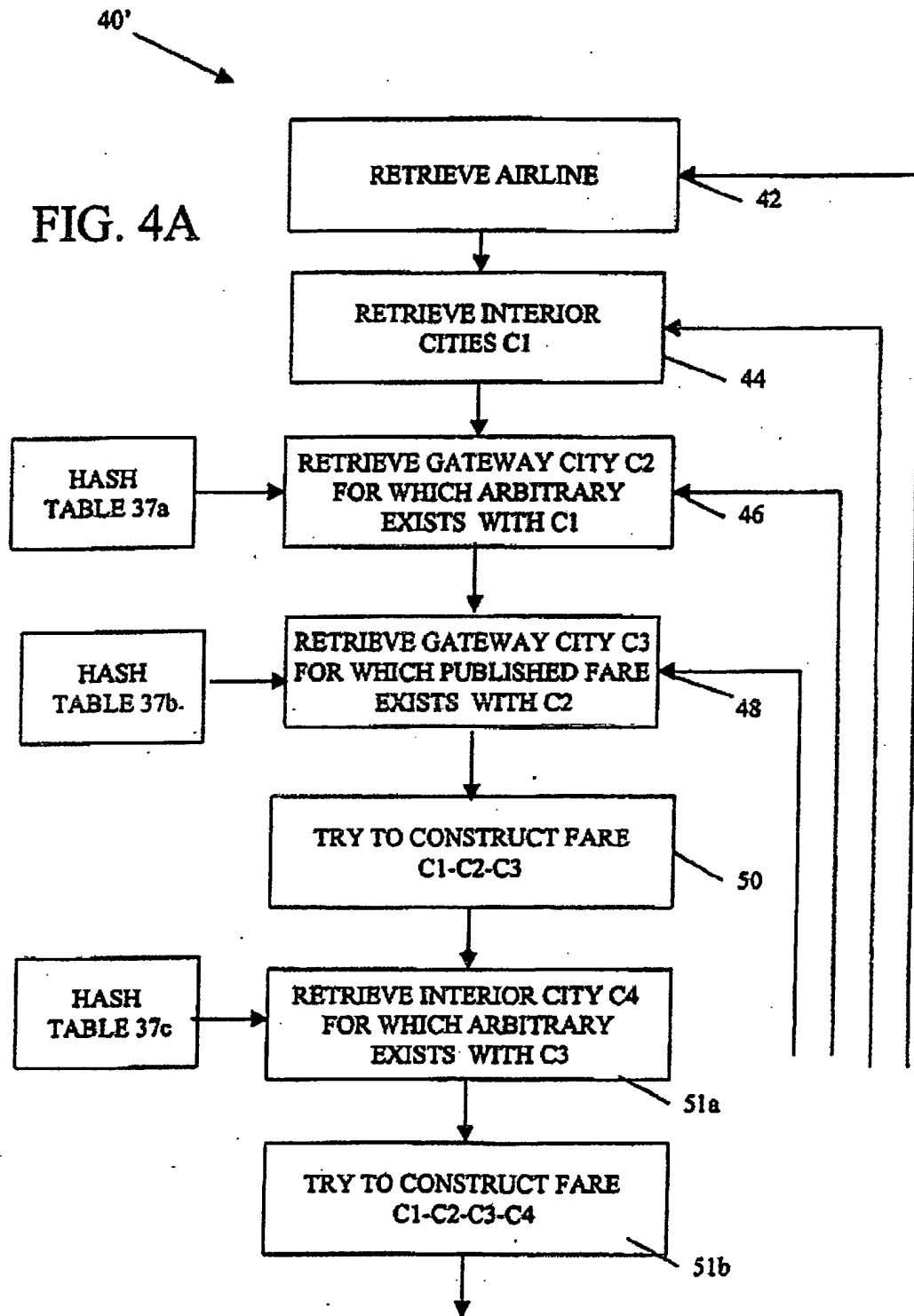
(A130.)

Having determined in advance (1) which interior cities actually appear in arbitraries with a given airline; (2) which gateway cities are associated with those interior cities in arbitraries; (3) which gateway cities appear with the gateway cities of step 2 in published fares for an airline; and (4) interior cities associated with the gateway cities of step 3 in arbitraries for an airline, computation of constructed fares can now proceed efficiently.

The full algorithm for generated constructed fares of an arbitrary, a published fare and another an arbitrary, over all airlines is depicted in FIGS.

4A-4C:

FIG. 4A



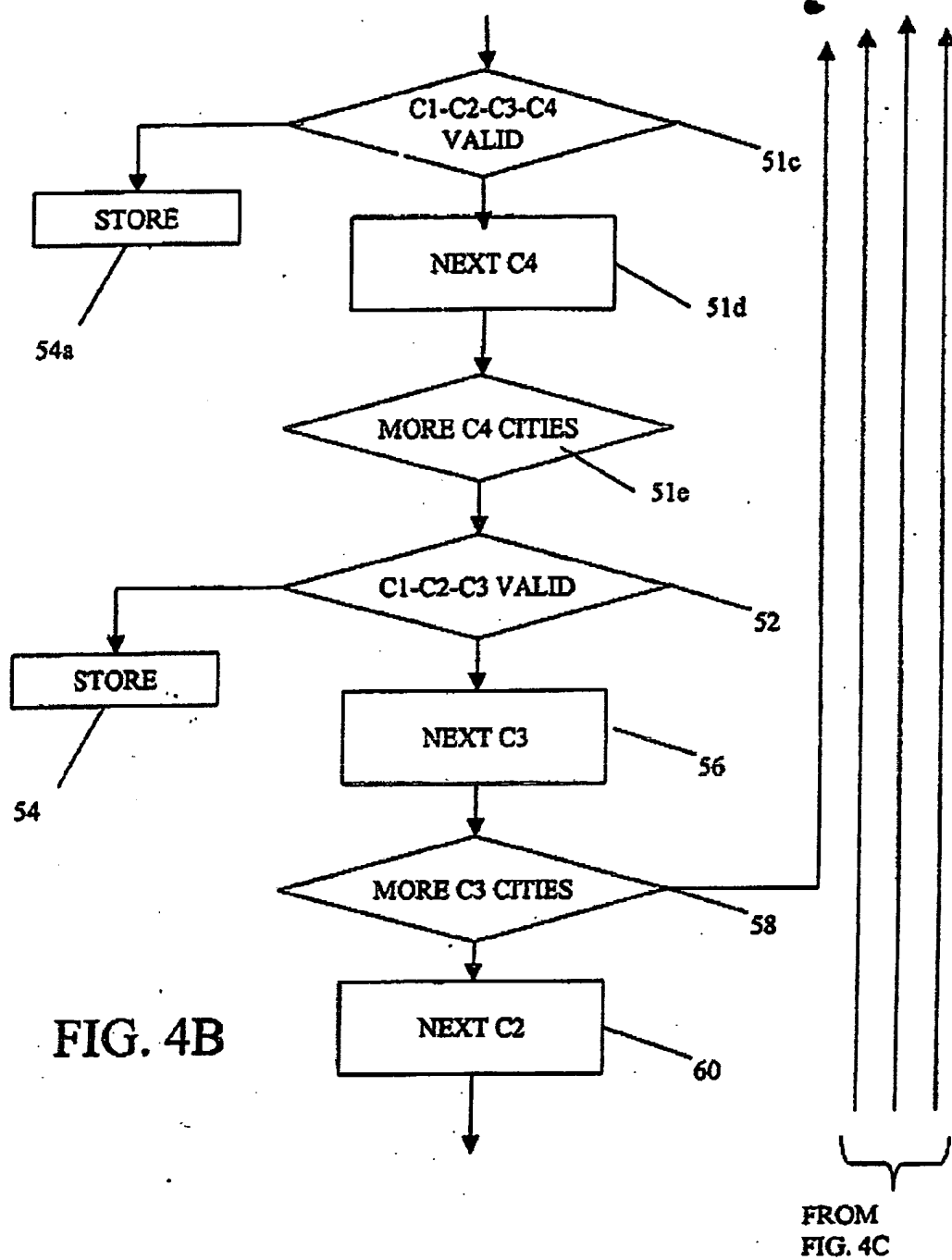
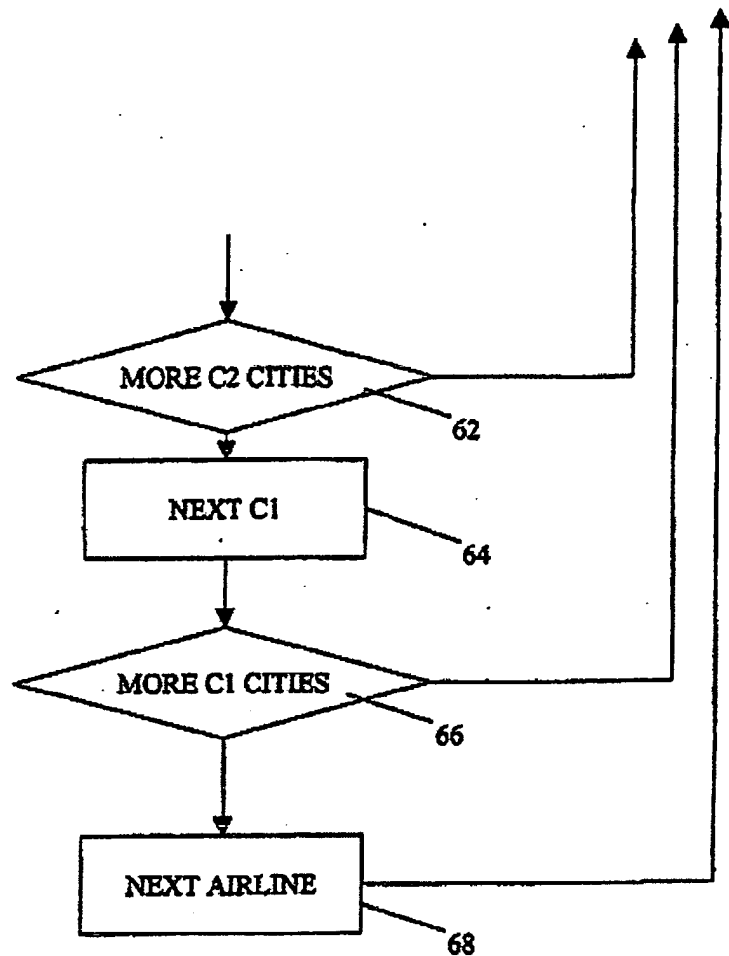


FIG. 4C



(A133-35.)

In words, the process is as follows: Begin with the first airline A. Retrieve the interior cities C1 that are found in the first hash table with airline A—that is, only those interior cities that appear in an arbitrary with the airline. (A109.) Then, for each city C1, retrieve from the first hash table

a gateway city C2 for which the airline provides an arbitrary specifying a fare from city C1 to city C2. (*Id.*)

Using the second hash table, retrieve a gateway city C3 for which the airline publishes a fare from city C2 to city C3. (A109.)

Next, using the third hash table, retrieve an interior city C4 for which the airline provides an arbitrary specifying a fare from city C3 to city C4. (A110.)

With this retrieved data the constructed fares are produced. If C1-C2-C3-C4 is a valid constructed fare (i.e., comports with applicable fare rules), then a valid constructed fare has been determined. The constructed fare is stored. (A110.)

The algorithm is repeated for each interior city C4. (A110.) When all interior cities C4s have been exhausted, if C1-C2-C3 is a valid fare, this fare is stored as well. The algorithm is then repeated for each gateway city C3, then each gateway city C2, then each interior city C1, then each airline A. (A110-11.) At the end of this process, a table of all unpublished fares will have been stored.

Because this algorithm looks only at interior cities that are actually part of arbitraries for a given airline, and at gateway cities that are actually

part of published fares, the number of determinations required to compile a complete list of constructed fares is dramatically reduced. (A111.)

D. Memoization

In addition to the novel process described above, Mr. Baggett's disclosure describes another technique to increase efficiency. This technique is called "memoization." As the specification explains:

Memoization is a technique for speeding up certain kinds of algorithms. If an expensive procedure is called many times, and if the procedure's output depends only on the input (i.e., the answer is not dependent on any external factors, such as the current time), then memoization can be used.

(A113.) Memoization is particularly useful in fare construction because it allows frequently-used airline-specific fare rules to be locally stored rather than continuously retrieved from a remote database. (A114.)

E. The Rejected Claims

1. Group One: All Claims

Claim 1³ begins by reciting a "method of producing a constructed fare that includes an arbitrary added to a published fare said method executed in a computer system." (A54.)

The claim recites "preprocessing" by "determining interior cities that appear with gateway cities in arbitraries for an airline." (A54.) As

³ All claims include a limitation similar to "determining interior cities that appear with gateway cities in arbitraries for an airline." For the purposes of this appeal, claim 1 is treated as representative with respect to this limitation.

described above (*supra*, § V.C), Mr. Baggett recognized the benefits of determining those interior cities that actually appear with gateway cities in arbitraries for an airline, performed as a preprocessing step. Performing this step reduces the number of cities that need to be examined, thus increasing computational efficiency. (A108.)

Claim 1 next requires “searching a database having published fares for gateway cities corresponding to the determined interior cities appearing in the arbitraries.” (A54.)

The claim then recites “producing the constructed fare” by “applying an arbitrary corresponding to one of the interior cities to a published fare involving one of the gateway cities that corresponds to the determined interior cities appearing in the arbitraries.” (A54.) Once the interior cities have been determined and the relevant published fares have been located, all that remains, for each determined interior city, is to apply the appropriate arbitrary to the published fare to produce a constructed fare.

Finally, the claim requires “storing the constructed fare” for later use.

2. Group Two: Claims 11, 16, 32, 37, 54, and 55

Claim 11⁴ depends from claim 1 and recites two additional steps.

First, claim 11 requires “determining a second set of interior cities that appear with a second gateway city in the published fare for the airline.”

(A55.) In some embodiments, this is accomplished by reference to a hash table. (*See supra*, § V.C; A110.)

Claim 11 then requires “applying an arbitrary that extends the published fare to a city from the second set of interior cities to produce a three component constructed fare.” (A56.) A three-component constructed fare begins and ends in an interior city. (*See supra*, § V.A.)

3. Group Three: Claims 2-6, 21, 23-27, 42, 52, and 53

Claim 2⁵ depends from claim 1 and further requires:

2. The method of claim 1 wherein determining interior cities comprises:

accessing a hash table indexed by an airline, interior-city pair to return a list of gateway cities for which an airline has arbitraries that specify the interior city.

(A54.)

⁴ For the purposes of this appeal, claim 11 is representative of claims 16, 32, 37, 54, and 55, in that each of these claims includes a limitation similar to “determining a second set of interior cities.”

⁵ For the purposes of this appeal, claim 2 is representative of claims 3-6, 21, 23-27, 42, 52, and 53, in that each of these claims recites a hash table.

As discussed above in connection with the specification's description of an embodiment of this claim (*supra*, § V.C), this step reflects Mr. Baggett's insight that one way to efficiently determine interior cities to be searched is by using a hash table that is indexed by an airline, interior city pair, and which returns a list of gateway cities. (A109.) Because the hash table need not include entries for all cities, but rather only for those cities that actually appear in arbitraries for a given airline, the number of interior cities that need to be considered is limited. (*See* A108.) And because the hash table returns only those gateway cities that actually appear in arbitraries with the determined interior cities, the number of gateway cities that need to be searched is likewise limited. (*Id.*)

Claim 4 recites:

The method of claim 1 wherein searching for gateway cities comprises:

accessing a hash table indexed by an airline, gateway pair to return a list of gateway cities that an airline publishes fares from the determined gateway to another gateway city.

(A54.) One embodiment of this second hash table was described above (*see* discussion *supra*, § V.C).

4. Group Four: Claims 9, 20, 29, and 41

Claim 9⁶ is a dependent claim that recites the following additional steps:

determining if an entry in a construction table was memoized before accessing the construction table; and

if the entry was memoized, retrieving an answer from a store of memoized entries to apply to the constructed fare.

(A621.) Thus, in some embodiments, a “memoized” entry, such as an entry that was used recently, need not be retrieved from a remote database, but rather can be retrieved from a separate store of entries.

F. The Prior Art

1. ATPCO's Unpublished Fares Product and Manual

A company known as the Airline Tariff Publishing Company (ATPCO) provides a list of constructed fares through a product called The Unpublished Fares Product. The Unpublished Fares Product is discussed in the specification of the present patent application (A101), and is referred to by the Board and the examiner as admitted prior art.

ATPCO also publishes a Construction Manual (the “ATPCO Manual”). (A15 at FF #12.) The ATPCO Manual says little about how constructed fares are generated, except that “every possible constructed

⁶ For the purposes of this appeal, claim 9 is representative of claims 9, 20, 29, and 41, in that each of these claims requires “memoization.”

record will be attempted” and “within this group of all possibly constructed records the elimination process begins.” (A1004-05.)

2. Gardner

U.S. Patent Application No. 2002/0178034 (“Gardner”) discloses an airline ticketing system that combines a sales transaction with a usage transaction, so that the final sale of a ticket does not take place until a traveler actually boards an airplane. (A1178 at ¶¶ 17-18.)

Gardner’s disclosure of unpublished fares is succinct. Gardner explains:

For each [trip] component identified, pricing services driver 180 typically will seek to determine the unpublished fare for the component. This process typically involves retrieving the agreements and calling unpublished footnote retrieval/validation module 190. After doing this, *the unpublished fare is retrieved using unpublished fare retrieval/validation module 194*. Next, the published routings retrieval/validation module 196 is called. Additionally, the process returns an array of unpublished fares.

(A1183 at ¶ 98 (emphasis added).) Thus, the full extent of Gardner’s disclosure of an unpublished fare is that an unpublished fare is “retrieved” using a module 194 whose mode of operation is never explained.⁷ (See also A1184 at ¶ 104 (“[T]he process will call unpublished fare

⁷ The use of the term “retrieved,” however, suggests that Gardner relies on a product such as the Unpublished Fares Product provided by ATPCO to look up a fare based on a pair of cities.

retrieval/validation module 194 to retrieve and validate the unpublished rules.”.)

3. Tremblay

Tremblay⁸ is a computer science textbook whose relevant disclosure explains the concept of an “edge list,” which is a data structure used to represent a “graph.”

A graph is essentially a connected set of nodes. The connections between nodes are called “edges.” Thus, an “edge list” is a data structure used to describe a graph. Each entry in an edge list represents a pair of connected nodes. (A67.)

Tremblay includes no discussion of any sort of airline pricing algorithms.

4. Wiederhold

Wiederhold⁹ is another computer science textbook that describes, in relevant part, the use of “hashed files.” Hashed files are files on a disk that provide a mechanism for locating information in so-called “constant time.”¹⁰ (A30 at FF #34; A940.) Although Wiederhold discloses that hashed files

⁸ JEAN-PAUL TREMBLAY & PAUL G. SORENSON, *An Introduction to Data Structures with Applications* (2d ed. 1984).

⁹ GIO WIEDERHOLD, *File Organization for Database Design* (1987).

¹⁰ That is, the amount of time to locate information in a hashed file is the same no matter how large the file is.

may be used in “pricing tables” (A940), Wiederhold contains no disclosure of using hash tables¹¹ to compute constructed fares.

G. The Board’s Decision

1. Group One: All Claims

The Board’s rejection of claim 1¹² relied on the notion that “determining interior cities that appear with gateway cities in arbitraries” is merely part of “determining an arbitrary.” The Board began with the proposition that Gardner discloses storing unpublished fares that must be constructed as the combination of an add-on amount and a published fare. (A22-23.) From this, the Board inferred that “some preprocessing necessarily occurred.” (A23.) The Board’s reasoning continued:

Published fares are fares between cities [FF 02]. However, because travel relying on an arbitrary requires that one of the cities in the arbitrary be a gateway city [FF 03], at least one of the cities in each published fare used to create an unpublished fare must be a gateway city. So now we have established that the preprocessing necessarily performed by Gardner must have determined an arbitrary and a published fare that could be added to the arbitrary to create an unpublished fare. Since an arbitrary is an ordered set of a gateway and interior city [FF 03], determining an arbitrary necessarily determines the interior city that appears with the gateway city in an arbitrary for an airline.

¹¹ The claims recite a hash table, not a hashed file. There is no evidence in the record about the use of hash tables in the prior art.

¹² As noted above, all claims include a limitation similar to “determining interior cities that appear with gateway cities in arbitraries.”

(A23 (emphasis added).) Thus, the Board concluded that “determining interior cities that appear with gateway cities in arbitraries for an airline” is satisfied simply by determining an *arbitrary*.

Significantly, the Board did not construe the claims or consult the intrinsic record. The Board did not, for example, reference the specification’s discussion of determining only those interior cities that actually appear in an arbitrary for an airline (A108; *see supra*, § V.C), or how this discussion might affect the meaning of the term “determining interior cities that appear with gateway cities in arbitraries for an airline, as that term is recited in the claims.” Nor did the Board acknowledge that the “applying an arbitrary” step of claim 1 refers to the interior cities “*determined*” by the previous “determining interior cities” step.

2. Group Two: Claims 11, 16, 32, 37, 54, and 55

The Board’s rejection of claim 11¹³ similarly relied on the idea that “determining a second set of interior cities” is merely part of “determining an arbitrary.” The Board held that “the determination of an arbitrary thus determines a second set of interior cities that appear with a second gateway city in the published fare for an airline.” (A27.) The Board observed that ATPCO discloses “extending a published fare with a second arbitrary,” and

¹³ Claims 11, 16, 32, 37, 54, and 55 all require determining a second set of interior cities.

concluded that a “second arbitrary is necessarily determined.” (A27.) The Board did not reference the specification’s discussion of determining only the relevant interior cities, rather than considering all possible interior cities. (A108; *see supra*, § V.C.) Nor did the Board discuss the separately-recited step of “applying an arbitrary” in claim 11.

3. Group Three: Claims 2-6, 21, 23-27, 42, 52, and 53

The Board reversed the Examiner’s rejection of claim 2,¹⁴ but entered a new ground of rejection. (A28-31.) Citing general computer science treatises (Tremblay and Wiederhold), the Board held that it would have been obvious to “access[] a hash table indexed by an airline, interior-city pair to return a list of gateway cities for which an airline has arbitraries that specify the interior city.” (A28-31.) The Board’s reasoning again proceeded along a string of inferences, many of which were unsupported by any citation to the record.

[1] First we find that because an airline fare data structure is essentially the same as an airline route structure, but with fares instead of distance, and [2] because an airline route structure is a graph having a node for each origin and destination and an edge for each flight between each source and destination pair, [3] the structure for airline fares used by Gardner and ATPCO are those of graphs. [4] An effective data structure for representing such a graph is an edge list, which is indexed by each origin city [FF 31]. [5] Each edge represents a particular

¹⁴ Claims 2-6, 21, 23-27, 42, 52, and 53 all require a hash table.

flight and therefore a particular airline. [6] Thus each entry in the edge list would be indexed by the airline and the origin city.

[7] Next we find that a hash table is one of the oldest data structures used for disk files and is known to be appropriate for pricing and schedules [FF 33]. A hash table is accessed in constant time [FF 34].

[8] Thus, one of ordinary skill would have searched pricing and flight schedules by Gardner and ATPCO using hash tables and indexes on airline and origin. The origin would have been an interior city for a flight starting in an interior city (claims 2, 5, 21, 23, 25, 26, 42, 52, 53, 54, and 55) and gateway for a flight connecting to a flight from an interior city (claims 4, 5, 21, 25, 42, 54, and 55). The search would have been performed in constant time (claims 3, 6, 24, and 27).

(A30-31 (numeration added).)

Nowhere in the Board's analysis did the Board identify any reference disclosing claim 2's requirement of a hash table "indexed by an airline, interior-city pair." Nor did the Board point to any reference proposing claim 2's recitation of a hash table that "return[s] a list of gateway cities for which an airline has arbitraries that specify the interior city." Nor, in fact, did the Board identify any reference suggesting the use of hash tables in the context of producing constructed fares.

4. Group Four: Claims 9, 20, 29, and 41

The Board initially affirmed the Examiner's rejection of claim 9, misreading the claim's requirement of "memoization" to instead recite

“memorization.” (A26.) On reconsideration, the Board recognized its error.

It held:

The Appellant argues that we misapprehended the claim by referring to memorization rather than memoization (Request 16:¶ IX). We agree. We and the Examiner misread the term “memoization” in claim 9 as “memorization.” Memoization is defined in the Specification 14:26 - 15:7 as a process that records queries and compares them to subsequent queries so that a repletion of a prior query is answered from the store of prior queries instead of a new query to a database. The Examiner did not show where any of the art described this and we have not found the art to describe this. Thus, the Appellant has overcome its burden of showing error in the rejection of claim 9.

(A7.)

Claims 20, 29, and 41, like claim 9, require memoization. The Board, however, failed to reverse its previous decision with these claims. Nor did the Board offer any explanation for its failure to do so. (*See id.*)

VI. SUMMARY OF THE ARGUMENT

Underlying the Board’s rejection of each of the pending claims is the Board’s belief that “determining interior cities that appear with gateway cities in arbitraries” is inherent in “determining an arbitrary.” As a matter of law, the Board’s belief is incorrect. As discussed above (*supra*, § V.C), the specification provides extensive guidance regarding what “determining interior cities” entails—determining which interior cities appear in gateway

cities in arbitraries for a given airline. This is very different from simply “determining an arbitrary,” which entails no such determination.

The Board compounded its error by holding that “determining a second set of interior cities” is inherent in determining an arbitrary. As discussed above (*supra*, § V.C), determining a second set of interior cities is a process that is different from simply determining an arbitrary.

The Board also erred in finding that it would have been obvious to use a hash table indexed by an airline, interior-city pair to return a list of gateway cities for which an airline has arbitraries that specify the interior city as part of the “determining interior cities” step. The Board cited two general computer science treatises discussing the general concepts of hashed files and edge lists. These references do not disclose indexing a table by an airline, interior city pair, nor do they describe a table that returns a list of gateway cities. The Board’s opinion that these elements would have been obvious rests on no record evidence beyond the Board’s own bare assertion.

Finally, the Board erred in failing to reconsider and allow each of the claims reciting “memoization” after acknowledging that no record evidence disclosed or suggested “memoization.” The Board’s acknowledgement led it to reconsider its previous decision and allow claim 9, yet the Board failed to reconsider the rejection of claims 20, 29, or 41 which also recite

memoization. Because, as the Board admits, neither the Examiner nor the Board cited any art disclosing memoization, nor did the Examiner or the Board suggest that such a limitation would have been obvious, these claims should have been allowed.

VII. ARGUMENT

A. Legal Standards

1. Standard of Review

The PTO bears the initial burden of presenting a prima facie case of unpatentability. *In re Glaug*, 283 F.3d 1335, 1338 (Fed. Cir. 2002). If the PTO fails to meet this burden, then the applicant is entitled to a patent. *Id.* If the PTO does make a prima facie case, the applicant may come forward with evidence or argument supporting patentability. Patentability is then determined on the entirety of the record, by a preponderance of evidence and weight of argument. *Id.*

This Court reviews the Board's factual determinations to determine whether they are supported by substantial evidence in the record. *In re Kotzab*, 217 F.3d 1365, 1369 (Fed. Cir. 2000) “‘Substantial evidence’ is relevant evidence that a reasonable mind might accept as adequate to support a conclusion.” *In re Alonso*, 545 F.3d 1015, 1019 (Fed. Cir. 2008) (citations and quotation marks omitted). In making this determination, this Court examines “the record as a whole, taking into account evidence that both

justifies and detracts from an agency's decision." *In re Gartside*, 203 F.3d 1305, 1312 (Fed. Cir. 2000).

Obviousness is a legal conclusion based on underlying facts. *In re Kumar*, 418 F.3d 1361, 1365 (Fed. Cir. 2005). This Court reviews the PTO's ultimate conclusion of obviousness *de novo*. *In re Kotzab*, 217 F.3d at 1369.

The Administrative Procedure Act ensures due process and non-arbitrary decision making. *In re Kahn*, 441 F.3d 977, 988 (Fed. Cir. 2006). Under the Administrative Procedure Act, rejections on obviousness grounds cannot be sustained by mere conclusory statements, rather "there must be some articulated reasoning with some rational underpinning to support the legal conclusion of obviousness." *In re Kahn*, 441 F.3d 977, 988 (Fed. Cir. 2006)

2. Inherency

To support a claim that a reference "inherently" discloses a limitation, the PTO must present evidence that "make[s] clear that the missing descriptive matter is necessarily present in the thing described in the reference, and that it would be so recognized by persons of ordinary skill." *Cont'l Can Co. USA, Inc. v. Monsanto Co.*, 948 F.2d 1264, 1268 (Fed. Cir. 1991) (emphasis added). "Inherency . . . may not be established by

probabilities or possibilities. The mere fact that a certain thing may result from a given set of circumstances is not sufficient.” *Id.* at 1269 (quoting *In re Oelrich*, 666 F.2d 578, 581 (C.C.P.A. 1981)).

B. Every Claim Is Allowable Because None of the Prior Art Discloses or Would Have Rendered Obvious “Determining Interior Cities That Appear With Gateway Cities in Arbitraries” or Similar Steps

The Board ignored the specification’s extensive description of “determining interior cities that appear with gateway cities in arbitraries for an airline,” and instead held that this step is satisfied simply by “determining an arbitrary.” This ruling lacked substantial evidence and was erroneous. *See In re Kotzab*, 217 F.3d at 1371 (“Based on the entirety of Evans’ disclosure, we cannot say that there is such relevant evidence as a reasonable mind might accept as adequate to support the [PTO’s] conclusion. . . .”). Because this limitation or a variation of this limitation is present in every claim, the Board’s ruling should be reversed.

The “determining interior cities” step takes advantage of Mr. Baggett’s recognition that not all interior cities are part of arbitraries for a given airline. Thus, while a straightforward, inefficient implementation of a fare construction system would consider every possible city, the claimed invention first “determin[es] interior cities that appear with gateway cities in

arbitraries for an airline.” It is only the “determined interior cities,” not all possible interior cities, that are used later in the claimed process.

The Board improperly found that the “determining interior cities” step was inherently disclosed in Gardner. Gardner discloses only storing and retrieving unpublished fares. (A1183-84.) The Board held, however, that the unpublished fares must have been created by applying an arbitrary to a published fare. (A23.) Thus, Gardner must have “determined an arbitrary.” (A23.) Because, according to the Board, “determining an arbitrary *necessarily determines* the interior city that appears with the gateway city in an arbitrary for an airline,” (A23 (emphasis added)), the Board found that Gardner inherently discloses this claim limitation.

But determining an arbitrary does not necessarily “determine interior cities that appear with gateway cities in arbitraries,” as the claim requires. Rather, determining interior cities is a separate step that takes advantage of Mr. Baggett’s observation that not all interior cities are found in arbitraries with an airline. (*See supra*, § V.C.)

Determining interior cities that appear with gateway cities in arbitraries is not a step performed by Gardner. Rather, Gardner only describes accessing a list of unpublished fares. These unpublished fares

could have been produced in any number of ways, such as by the straightforward, inefficient algorithm described above (*supra*, § V.B).

There is no evidence, let alone substantial evidence, that the cited art discloses or would have suggested to a person of ordinary skill in the art the claimed step of “determining interior cities that appear in arbitraries for an airline.” By holding that the prior art, disclosing only applying an arbitrary, renders this step obvious, the Board improperly read out this limitation from the claims of Group One.

C. None of the Prior Art Discloses or Would Have Rendered Obvious “Determining a Second Set of Interior Cities” as Recited in the Claims of Group Two

The Board’s rejection of the claims of Group Two was flawed for similar reasons. Claim 11 recites, “determining a second set of interior cities that appear with a second gateway city in the published fare for the airline.” The Board, however, assumed that this limitation could be satisfied simply by determining an arbitrary, and looking at the interior city in that arbitrary. (A27.) The Board ignored the specification’s description of determining only those interior cities that actually appear in an arbitrary with a second gateway city in a published fare for an airline—the same published fare that was referenced in claim 1. The claim limitation narrows the number of interior cities that need to be searched—but the Board’s interpretation

eviscerates this novel aspect of the invention. No substantial evidence supports the Board's holding that the claims of Group Two would have been obvious.

D. There Is No Record Evidence to Support the Board's Obviousness Holding Regarding the Claims of Group Three

1. The Board's Findings Were Unsupported by Substantial Evidence

The Board's reasoning in rejecting the claims of Group Three rests on a series of "findings" that are unsupported by any record evidence, much less "substantial evidence." Exemplary claim 2 requires "accessing a hash table indexed by an airline, interior-city pair to return a list of gateway cities for which an airline has arbitraries that specify the interior city."

Acknowledging that none of the art cited by the Examiner discloses hash tables of any sort, the Board cited two references, Tremblay and Wiederhold, both general computer science treatises. Based on the description in these references of the general concepts of hashed files and edge lists, the Board applied a series of attenuated inferences to arrive at the conclusion that the claim would have been obvious to a person of ordinary skill in the art.

The Board's logic proceeded as follows:

1. "[A]n airline fare data structure is essentially the same as an airline route structure, but with fares instead of distance. . . ." (A30.) No reference before the Board suggests such an inference.
2. "[A]n airline route structure is a graph having a node for each origin and destination and an edge for each flight between each source and destination pair" (A30.) Again, no reference before the Board suggests this inference.
3. "[T]he structure for airline fares used by Gardner and ATPCO are those of graphs." (A30.) Nothing in Gardner, ATPCO, or any other reference suggests that Gardner and ATPCO use graphs. Moreover, to the extent the Board is suggesting that graphs are inherent in the disclosure of Gardner and ATPCO, the Board has failed to account for the possibility of using data structures other than graphs. Gardner and ATPCO simply do not disclose what data structures are used to represent fares.
4. "An effective data structure for representing such a graph is an edge list, which is indexed by each origin city [FF 31]." (A30.) Tremblay discloses that an edge list is one data structure that may be used to represent a graph. But neither any reference

before the Board, nor the Board's own findings of fact, suggests the use of an edge list "indexed by each origin city."

5. "Each edge represents a particular flight and therefore a particular airline." (A30.) No reference before the Board suggests this inference.
6. "Thus each entry in the edge list would be indexed by the airline and the origin city." (A30-31.) The Board fails to explain why a person of ordinary skill in the art would have created an edge list indexed by airline. Just a few sentences earlier (no. 4 above), the Board found that the edge list would be indexed by *origin city*. Without any support, the Board now holds that the index would actually include both origin city as well as airline.
7. "Next we find that a hash table is one of the oldest data structures used for disk files and is known to be appropriate for pricing and schedules [FF 33]. A hash table is accessed in constant time [FF 34]." (A31.) The references before the Board, and its own findings of fact, discuss "hashed files," not hash tables.

8. “Thus, one of ordinary skill would have searched pricing and flight schedules by Gardner and ATPCO using hash tables and indexes on airline and origin. The origin would have been an interior city for a flight starting in an interior city . . . and gateway for a flight connecting to a flight from an interior city. . . .” (A31.). The Board concludes that one of ordinary skill in the art would have searched pricing tables and flight schedules, although those features not involved in the claims.

Notwithstanding the Board’s argument, neither Tremblay nor Wiederhold nor ATPCO nor Gardner suggests a hash table indexed by an airline, interior-city pair that returns a list of gateway cities. These references do not disclose indexing a table by an airline, interior city pair, nor do they describe a table that returns a list of gateway cities. Because the Board’s findings are unsupported by substantial evidence, it has failed to make out a *prima facie* case of obviousness, and its rejection of the claims of Group Three should be reversed.

2. The Board Failed to Satisfy Its Burden of Showing a Reason Why a Person of Ordinary Skill in the Art Would Have Combined the Cited References

Second, the Board failed to explain why a person of ordinary skill in the art would have had a reason to use a hash table. *See KSR Int’l Co. v.*

Teleflex Inc., 550 U.S. 398, 127 S. Ct. 1727, 1741 (2007) (“[A] patent composed of several elements is not proved obvious merely by demonstrating that each of its elements was, independently, known in the prior art.”); *Takeda Chem. Indus., Ltd. v. Alphapharm Pty., Ltd.*, 492 F.3d 1350, 1356-57 (Fed. Cir. 2007) (after *KSR*, reiterating the need to find a reason to combine prior art references).

The full extent of Gardner’s disclosure is its statement that “the unpublished fare is retrieved using unpublished fare retrieval/validation module 194.” (A1183, ¶ 98.) The Board has failed to explain why a person of ordinary skill in the art would use a hash table to retrieve unpublished fares and fails to explain how that related to producing of constructed fares. Such a person would have had many other options, including simply retrieving the unpublished fare using ATPCO’s Unpublished Fare Product. Nor has the Board explained how a person of ordinary skill in the art would use a hash table in the context of producing constructed fares.

The tertiary references relied on by the Board namely, Tremblay and Wiederhold do not provide any suggestion to one of ordinary skill that a hash table arranged as in claim 2 would have improved performance for constructing the fares in Gardner and ATPCO. This follows because nothing in Tremblay or Wiederhold mentions any details concerning

“constructed fares.” Despite Wiederhold’s mention of pricing tables, nothing in those references suggest the desirability of pre-processing and in particular the use of the claimed hash table in the context of the problem that Appellant solves. None of the references appreciated the recognitions made by the inventor regarding the structure of the data used in construction of the “constructed fares.”

Because the Board has failed to show why a person of ordinary skill in the art would have combined the references to arrive at the claimed invention, the Board has not satisfied its burden of presenting a prima facie case of obviousness. Its rejection of the claims of Group Three should be reversed.

E. The Board Erred in Failing to Correct its Misreading of “Memoization” in the Claims of Group Four

In its decision on Mr. Baggett’s petition for reconsideration, the Board acknowledged that “the Examiner did not show where any of the art described [memoization] and we have not found the art to describe this.” (A7.) Thus, the Board concluded, “the Appellant has overcome its burden of showing error in the rejection of claim 9.” (A7.)

The Board, however, failed to reconsider its rejection of claims 20, 29, or 41. Each of these claims recites memoization as a substantive limitation on the claims. Because, as the Board noted, neither the Examiner

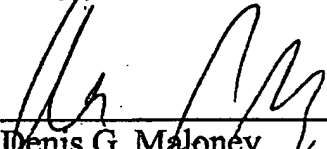
nor the Board cited any art disclosing memoization, nor did the Examiner or the Board suggest that such a limitation would have been obvious, these claims should have been allowed.

VIII. CONCLUSION

For all of the forgoing reasons, this Court should reverse the ruling of the Board of Patent Appeals and Interferences, and remand the case with instructions to allow all pending claims.

December 17, 2008

Respectfully submitted,



Denis G. Maloney
Fish & Richardson P.C.
225 Franklin Street
Boston, MA 02110
Tel: (617) 542-5070

Attorney for Appellant
David M. Baggett

ADDENDUM

1 UNITED STATES PATENT AND TRADEMARK OFFICE

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3
4 BEFORE THE BOARD OF PATENT APPEALS
5 AND INTERFERENCES
6

7
8 *Ex parte* DAVID M. BAGGETT
9

10 Appeal 2007-2648
11 Application 09/877,159
12 Technology Center 3600
13
14

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16 Decided: July 10, 2008
17
18

19 Before HUBERT C. LORIN, ANTON W. FETTING, and JOSEPH A.
20 FISCHETTI, *Administrative Patent Judges*.

21
22 FETTING, *Administrative Patent Judge*.
23

24
25 DECISION ON REQUEST FOR REHEARING
26

27 The Appellant filed a "REQUEST FOR RECONSIDERATION OF
28 THE DECISION ON APPEAL DATED MARCH 10, 2008" on May 5,
29 2008. The Examiner rejected claims 1-46 and 52-55 under 35 U.S.C.
30 § 103(a) as unpatentable over Gardner, Admitted Prior Art, and ATPCO.
31 We affirmed the rejection of claims 1, 7-20, 22, and 28-41 in our Decision,

1 but reversed the rejection of claims 2-6, 21, 23-27, 42, and 52-55. We
2 entered a new ground of rejection of claims 2-6, 21, 23-27, 42, and 52-55
3 under 35 U.S.C. § 103(a) as unpatentable over Gardner, ATPCO, the
4 admitted prior art, Tremblay, and Wiederhold. The Appellant seeks
5 reconsideration of the decision to affirm the rejection of claims 1, 7-20, 22,
6 and 28-41 and seeks withdrawal of the new ground of rejection of claims 2-
7 6, 21, 23-27, 42, and 52-55.

8 We GRANT-IN-PART the REQUEST FOR REHEARING to the
9 extent that we reverse the rejection of claim 9 under 35 U.S.C. § 103(a) as
10 unpatentable over Gardner, Admitted Prior Art, and ATPCO.

11

12 ISSUES

13 The issues pertinent to this request are whether the Appellant has
14 sustained its burden of showing that we misapprehended the art or the claims
15 and thus erred in sustaining the rejections of claims 1, 7-20, 22, and 28-41,
16 and whether we erred in rejecting claims 2-6, 21, 23-27, 42, and 52-55.
17 37 C.F.R. § 41.52(a)(1) and (3) (2007).

18

19 ANALYSIS

20 *Claims 1, 7, 8, 10-20, 22, and 28-41.*

21 We found in our decision that claims 1, 7, 8, 10-20, 22, and 28-41
22 were unpatentable over the prior art (Decision 19).

23 The Appellant argues that we misapprehended the arguments (Request
24 2:¶ II) and the references (Request 8:¶ VI); that we failed to consider all
25 claim limitations (Request 4:¶ III); and that we misapprehended the
26 applicable law (Request 5:¶ IV and 8:¶ V).

1 The Appellant contends that each of our recountings as to the
2 Appellant's arguments (Decision 13) misapprehended the argument
3 (Request 2-4:¶ II). The Appellant contends that its arguments were that
4 Gardner does not teach how to construct fares nor does it use arbitraries or
5 produce constructed fares, and that a combination of Gardner and ATPCO
6 would only result in a conventional cross product approach.

7 We responded to each of the arguments as the arguments were
8 contended by the Appellant (Decision 13-16). Thus, we do not find that we
9 misapprehended the Appellant's arguments.

10 The Appellant contends we misapprehended Gardner (Request 8-11:
11 ¶ VI). The Appellant does make any contention as to how we
12 misapprehended Gardner, but only as to the facts we inferred. The
13 Appellant contends that Gardner does not teach any algorithm to produce
14 constructed fares (Request 9:Top ¶). This argument relies on the special
15 meaning of the phrase "constructed fares" as a combination of a published
16 fare with one or more arbitraries, since Gardner clearly has a process for
17 constructing total fares by adding component fares together (Decision
18 :Findings of Fact 19 – 27). We did not find that Gardner explicitly taught
19 producing "constructed fares," but only that such constructed fares were
20 necessarily present in Gardner's data base (Decision 13:25 – 14:4). The
21 remainder of the Appellant's contentions under the heading "VI. The
22 Board's [sic] misapprehended the references" relate to claim construction
23 rather than misapprehension of the references, and we address those below.

24 The Appellant further contends that we misapprehended the law by
25 providing inadequate notice in failing to identify where critical teachings are
26 found (Request 5:¶ IV) and by improperly relying on inherency (Request 8:¶

1 V). As to the contentions under ¶ IV, the Appellant refers to Decision 13:3-
2 8 where we relate the Examiner's findings. These are supported by the
3 Examiner's Answer pages 3-5. The Appellant apparently takes our findings
4 as to what the Examiner's findings were to be our own independent findings
5 as to the art. Thus, since we did indicate where in the Answer these findings
6 were, the Appellant has not shown that we failed to provide adequate notice.

7 The Appellant also contends that inherency has no place in an
8 obviousness rejection, citing *In re Dillon*, 919 F.2d 688, 718. The
9 Appellant's reliance on *Dillon* is misplaced. In *Dillon*, a purported inherent
10 property was unknown. Thus, *Dillon* merely held that reliance on an
11 unknown inherent property was inappropriate in an obviousness rejection.
12 The instant case is not that of a composition having unknown properties as
13 in *Dillon*, but of the contents of a database that are created in a known and
14 deliberate manner. Thus, the Appellant has not shown we misapprehended
15 the law as to inherency.

16 Finally, the Appellant contends that we failed to consider all claim
17 limitations (Request 4:¶ III; also Request 7, 9, and 10). The Appellant
18 argues that we failed to show how an interrelationship between limitations
19 [1] and [3a] are shown in the art. This relationship is the correspondence
20 between interior cities found during preprocessing in limitation [1] and their
21 application in limitation [3] (Request 4:Bottom ¶).
22

23 We found that every unpublished fare stored in Gardner was constructed
24 by the process of step [3] in claim 1, leaving the issue as to whether steps [1]
25 and [2] were predictable to one of ordinary skill in constructing these
26 published fares (Decision 14:11-14). Limitation [3], apart from the
relationship so claimed, is simply the computation taught by ATPCO as we

1 found (Decision 14:15-25). We find that the Appellant does not contend
2 otherwise, but only that Gardner itself fails to teach this (Request 9:Top ¶)
3 and that this alone does not take into consideration the relationship as
4 claimed (Request 5:Second and third ¶'s).

5 As to whether Gardner describes the claimed computations, this is
6 irrelevant since ATPCO describes those computations and they were
7 necessarily performed to result in the fares stored in Gardner's database
8 according to the industry practices described by ATPCO and the admitted
9 prior art (Decision 13:25 – 14:25; also Findings of Fact 6 - 17).

10 We then found that this left the issue of whether limitations [1] and [2]
11 were predictable (Decision 14:13-14). This necessarily included the issue of
12 whether the correspondence so claimed was predictable. As we also found,
13 the preprocessing necessarily performed by Gardner must have determined
14 an arbitrary and a published fare that could be added to the arbitrary to
15 create an unpublished fare and that determining such an arbitrary necessarily
16 determines the interior city that appears with the gateway city in an arbitrary
17 for an airline (Decision 14:17-25). Thus there was a correspondence
18 between the interior cities found during preprocessing in limitation [1] and
19 their application in limitation [3], and the Appellant has not shown that we
20 failed to consider this limitation.

21 *Claims 2-6, 21, 23-27, 42, and 52-55.*

22 We entered a new ground of rejection under 35 U.S.C. § 103(a) as
23 unpatentable over Gardner, ATPCO, the admitted prior art, Tremblay, and
24 Wiederhold (Decision 20:1-3).

25 The Appellant argues that we did not consider the hash table index
26 values of claim 2. The Appellant first argues that neither Tremblay nor

1 Wiederhold describe the claimed index values and then argue that none of
2 Gardner, ATPCO, or the admitted prior art describe using a hash table.

3 The Appellant responds to the rejection by attacking the references
4 separately, even though the rejection is based on the combined teachings of
5 the references. Nonobviousness cannot be established by attacking the
6 references individually when the rejection is predicated upon a combination
7 of prior art disclosures. *See In re Merck & Co. Inc.*, 800 F.2d 1091, 1097,
8 231 USPQ 375, 380 (Fed. Cir. 1986). Wiederhold provides the explicit
9 rationale for applying hash tables to Gardner because hash tables are
10 frequently used in pricing tables such as that in Gardner because of its
11 superior access time (Decision 21: Findings of Fact 33 and 34). The index
12 values would necessarily be those required to look up the hash table
13 contents, i.e., the airline and cities served (Decision 22:6-12).

14 The Appellant also argues that we did not provide the documentary
15 evidence to support our finding that a fare data structure is similar to a route
16 data structure, and that a route schedule is not relevant (Request 14:¶ VIII).
17 We referred to a route list merely as an example of a graph that would be
18 indexed in a manner similar to the fare tables in Gardner. The tables of
19 published fares and arbitraries are similarly examples of graphs, since they
20 are tables of edges (fares and arbitraries) relating two vertices (cities). This
21 would have been instantly clear to one of ordinary skill of data base design
22 given the ubiquity of graph data and the notoriety of their application to
23 transportation problems. One glance at Tremblay's Fig. 5-4.21(a) showing a
24 picture of a graph would immediately show its relevance to one of ordinary
25 skill designing the database structure of Gardner. As we further found,
26 Tremblay describes using an edge list to store this graph data, and that this

1 must necessarily include an airline and an interior city pair (Decision 21:18
2 – 22:2). Thus, we find that whether route tables *per se* are relevant is not
3 pertinent to whether we erred in finding that one of ordinary skill would
4 have searched pricing and flight schedules by Gardner and ATPCO using
5 hash tables and indexes on airline and interior city.

6 The Appellant repeats its argument from claim 1 that the pre-processing
7 was not inherent (Request 12-13). This argument is unpersuasive here for
8 the same reasons we recited according to claim 1 *supra*.

9 *Claim 9.*

10 We found in our decision that claim 9 was unpatentable over the prior
11 art (Decision 19).

12 The Appellant argues that we misapprehended the claim by referring
13 to memorization rather than memoization (Request 16:¶ IX). We agree. We
14 and the Examiner misread the term “memoization” in claim 9 as
15 “memorization.” Memoization is defined in the Specification 14:26 – 15:7
16 as a process that records queries and compares them to subsequent queries
17 so that a repletion of a prior query is answered from the store of prior queries
18 instead of a new query to a database. The Examiner did not show where any
19 of the art described this and we have not found the art to describe this. Thus,
20 the Appellant has overcome its burden of showing error in the rejection of
21 claim 9.

22 For the above reasons we are not convinced of reversible error in our
23 decision as to all of the claims except claim 9. The Appellant’s request for
24 rehearing is granted, in that we withdraw the new ground of rejection as to
25 claim 9.

DECISION

To summarize, our decision is as follows:

- We have considered the REQUEST FOR REHEARING
 - We do not reverse the Examiner as to claims 1, 7, 8, 10-20, 22, and 28-41.
 - We reverse the Examiner as to claim 9.
 - We do not withdraw the new ground of rejection as to claims 2-6, 21, 23-27, 42, and 52-55.
 - The rejection of claims 1, 7, 8, 10-20, 22, and 28-41 under 35 U.S.C. § 103(a) as unpatentable over Gardner, Admitted Prior Art, and ATPCO remains sustained.
 - The rejection of claim 9 under 35 U.S.C. § 103(a) as unpatentable over Gardner, Admitted Prior Art, and ATPCO is not sustained.
 - The rejection of claims 2-6, 21, 23-27, 42, and 52-55 under 35 U.S.C. § 103(a) as unpatentable over Gardner, Admitted Prior Art, and ATPCO remains not sustained.
 - Claims 2-6, 21, 23-27, 42, and 52-55 remain rejected under 35 U.S.C. § 103(a) as unpatentable over Gardner, ATPCO, the admitted prior art, Tremblay, and Wiederhold.
- No rejection remains against claim 9.

No time period for taking any subsequent action in connection with this appeal may be extended under 37 C.F.R. § 1.136(a)(1)(iv) (2007).

GRANTED-IN-PART

Appeal 2007-2648
Application 09/877,159

1 hh

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3 FISH & RICHARDSON, PC

4 P.O. BOX 1022

5 MINNEAPOLIS, MN 55440-1022

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1 UNITED STATES PATENT AND TRADEMARK OFFICE

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3
4 BEFORE THE BOARD OF PATENT APPEALS
5 AND INTERFERENCES
6

7
8 *Ex parte* DAVID M. BAGGETT
9

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11 Appeal 2007-2648
12 Application 09/877,159
13 Technology Center 3600
14

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16 Decided: March 10, 2008
17

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19 Before HUBERT C. LORIN, ANTON W. FETTING, and
20 JOSEPH A. FISCHETTI, *Administrative Patent Judges*.
21 FETTING, *Administrative Patent Judge*.

22 DECISION ON APPEAL

23 STATEMENT OF CASE

24 David M. Baggett (Appellant) seeks review under 35 U.S.C. § 134 of
25 a final rejection of claims 1-46 and 52-55, the only claims pending in the
26 application on appeal.

1 We have jurisdiction over the appeal pursuant to 35 U.S.C. § 6(b)
2 (2002).

3 We AFFIRM-IN-PART and ENTER A NEW GROUND UNDER 37
4 C.F.R. § 41.50(b).

5 The Appellant invented a method of producing constructed fares by
6 adding to a published fare an amount, known in the art as an arbitrary, for
7 travel between an interior city and a gateway city. This is done by
8 determining interior cities that appear with gateway cities in arbitraries for
9 an airline, searching for gateway cities corresponding to the determined
10 interior cities appearing in the arbitraries and applying an arbitrary
11 corresponding to one of the interior cities to a published fare involving one
12 of the gateway cities to produce the constructed fare (Specification 3:2-11).

13 An understanding of the invention can be derived from a reading of
14 exemplary claims 1 and 2, which are reproduced below [bracketed matter
15 and some paragraphing added].

16 1. A method of producing a constructed fare that includes an
17 arbitrary added to a published fare, said method executed in a
18 computer system having memory and a persistent storage
19 device, the method comprising:

20 [1] preprocessing by:

21 determining interior cities that appear with gateway cities
22 in arbitraries for an airline,

23 the arbitraries being

24 published amounts and

25 an order [sic, ordered] set of two cities

26 that extend published fares

1 that include an amount for travel between
2 two cities to provide a bi-directional market;
3 and

4 [2] searching a database having published fares
5 for gateway cities corresponding to the determined
6 interior cities appearing in the arbitraries; and

7 [3] producing the constructed fare, by:

8 [a] applying

9 an arbitrary corresponding to one of the interior
10 cities

11 to a published fare involving one of the gateway
12 cities

13 that corresponds to the determined interior
14 cities appearing in the arbitraries

15 to produce a constructed fare; and

16 [b] storing the constructed fare in memory or the
17 persistent storage device of the computer system

18 for use in planning, faring and/or pricing.

19 2. The method of claim 1 wherein determining interior cities
20 comprises:

21 accessing a hash table

22 indexed by an airline, interior-city pair

23 to return a list of gateway cities

24 for which an airline has arbitraries that specify the
25 interior city.

26 This appeal arises from the Examiner's Final Rejection, mailed
27 October 11, 2005. The Appellant filed an Appeal Brief in support of the
28 appeal on August 2, 2006. An Examiner's Answer to the Appeal Brief was
29 mailed on December 7, 2006. A Reply Brief was filed on January 3, 2007.
30 The Appellant presented oral arguments at a hearing on February 20, 2008.

PRIOR ART

The Examiner relies upon the following prior art:

Gardner US 2002/0178034 A1 Nov. 28, 2002
Airline Tariff Publishing Company (ATPCO), ATPCO Construction Manual
(May 22, 1995).

We also discuss the following prior art:

Jean-Paul Tremblay and Paul G. Sorenson (Tremblay), *An Introduction to
Data Structures with Applications* 446-47 (Second Ed. 1984).
Gio Wiederhold (Wiederhold), *File Organization for Database Design* 192-
193 and 220-221 (1987).

REJECTION

Claims 1-46 and 52-55 stand rejected under 35 U.S.C. § 103(a) as
unpatentable over Gardner, Admitted Prior Art, and ATPCO.

ISSUE

The issue pertinent to this appeal is whether the Appellant has
sustained its burden of showing that the Examiner erred in rejecting claims
1-46 and 52-55 under 35 U.S.C. § 103(a) as unpatentable over Gardner,
Admitted Prior Art, and ATPCO.

The pertinent issue turns on whether the art applied describes or
suggests determining airline tariff variables during preprocessing and the use
of hash tables in searching airline tariff variables.

FACTS PERTINENT TO THE ISSUES

The following enumerated Findings of Fact (FF) are believed to be
supported by a preponderance of the evidence.

Facts Related to Claim Construction

1 01. A market is a city pair (Specification 1:4-5).

2 02. Published fares are stated prices for travel between two cities
3 (Specification 1:5-8).

4 03. An arbitrary, like a published fare, lists two cities. However,
5 unlike cities in a published fare (which establish a bidirectional
6 market), the cities in an arbitrary are ordered: the first is the
7 gateway (or major) city, and the second is the interior (or minor)
8 city (Specification 1:23-28).

9 04. A gateway city is therefore synonymous with a major city.

10 05. An interior city is therefore synonymous with a minor city.

11 *Facts Related to Appellant's Disclosure*

12 06. For markets involving minor cities the airlines rely on a process
13 called fare construction to produce fares that are sometimes called
14 "constructed fares." Fare construction is particularly used for
15 minor markets involving international travel (Specification 1:8-
16 12).

17 07. The airline industry fare construction process provides a
18 mechanism to extend a published fare with add-ons also called
19 arbitraries, in order to derive prices to minor cities.

20 08. Constructed fares within the meaning of the airline industry can
21 be either two-component constructed fares, i.e., one arbitrary
22 combined with one published fare or three-component constructed
23 fares, i.e., two arbitraries combined with one published fare
24 (Specification 1:28-31).

1 09. In general, two-component constructed fares provide prices
2 between a minor city and a major city, while three-component
3 constructed fares provide prices between two minor cities
4 (Specification 2:9-12).

5 10. One approach used to fare construction is to use a list of
6 constructed fares called "The Unpublished Fares Product" that is
7 available from Airline Tariff Publishing Company (ATPCO).
8 ATPCO is an intermediary that maintains fares published by
9 airlines and resellers. With "The Unpublished Fares Product" a
10 cross-product of all arbitraries and all base fares is determined and
11 provided into a list. That list can contain millions of constructed
12 fares (Specification 2:13-20).

13 11. Current ATPCO rules permit one arbitrary and one base fare or
14 two arbitraries and a base fare (Specification 12:29-30).

15 *ATPCO*

16 12. ATPCO is a manual directed to the use of ATPCO's service for
17 airline fare construction.

18 13. A published fare is an amount published for use in pricing air
19 transportation from one city to another city. Published fares price
20 in fare quote systems (ATPCO 58).

21 14. An arbitrary is an amount published for use only in
22 combination with other fares for the construction of through fares.
23 It is also referred to as "proportional fare," "basing fare," and
24 "add-on-fare." Arbitraries cannot be priced in fare quote systems

1 (ATPCO 58). Thus, arbitraries are not fares themselves, but are
2 used to construct fares.

3 15. An unpublished fare is the combination of an add-on amount
4 and a published fare amount resulting in an amount used in
5 pricing air transportation from one city to another city.
6 Unpublished fares are also referred to as "through fares,"
7 "constructed fares," and "behind point fares." Unpublished fares
8 price in fare quote systems (ATPCO 58).

9 16. This is how unpublished fares are constructed:
10 add-on + published fare = unpublished fare
11 published fare + add-on = unpublished fare
12 add-on + published fare + add-on = unpublished fare (ATPCO
13 58).

14 17. For the fares in [FF 16] to be meaningful, the add-on and
15 published fare must each have one city in common. That is, one
16 cannot depart from a city other than the origin without having
17 arrived in that city in a through-fare trip.

18 *Gardner*

19 18. Gardner is directed to reducing the costs and enhancing revenue
20 controls associated with airline travel distribution. Gardner
21 combines a sales transaction and a usage transaction into one
22 centralized transaction. The system includes a bill per use module
23 that combines each sales transaction with a corresponding usage
24 transaction into one centralized transaction. Accordingly, each
25 sales transaction represents a usage transaction. Thus, the bill per

1 use module eliminates the advanced issuance of an accountable
2 and specific travel authorization (Gardner ¶ 0017-18).

3 19. Gardner computes prices using pricing services driver; coupled
4 to: a fare component identification module; trip construction
5 identification module; local fare retrieval module; joint fare
6 retrieval module; footnote retrieval and validation module; market
7 routings validation module; unpublished fare retrieval/validation;
8 published rules retrieval/validation module; unpublished rule
9 retrieval/validation module; and a tax driver module (Gardner ¶
10 0095).

11 20. Fare component identification module identifies possible trip
12 components within an itinerary by grouping the itinerary segments
13 together in different ways to form possible fare components. The
14 fare component identification module prevents illogical
15 components from being generated (Gardner ¶ 0096).

16 21. Trip construction identification module identifies all possible
17 combinations of trip constructions that, when combined, can be
18 used to price all specified travel. This process will produce
19 pricing entities, each describing a different combination of logical
20 trip constructions that may produce the lowest ticket price
21 (Gardner ¶ 0097).

22 22. For each component identified, pricing services driver typically
23 will seek to determine the unpublished fare for the component by
24 retrieving the agreements and calling unpublished footnote
25 retrieval/validation module. After doing this, the unpublished fare

1 is retrieved using unpublished fare retrieval/validation module.

2 Next, the published routings retrieval/validation module is called.

3 Additionally, the process returns an array of unpublished fares
4 (Gardner ¶ 0098).

5 23. Pricing services driver can determine the published fares for the
6 components by calling retrieve local published fares module.

7 Retrieve local published fares module will retrieve published local
8 fares and add all qualifying round-trip and one-way fares to the
9 fares array (Gardner ¶ 0099).

10 24. By following these processes, the pricing services driver can
11 create a separate published and unpublished fares array for each
12 component within a pricing entity (Gardner ¶ 0101).

13 25. Pricing services driver performs published rules (Gardner ¶
14 0102).

15 26. Pricing services can determine the cheapest pricing entity based
16 on total published fare. This involves performing fares sorting
17 and the cheapest fare for each component is selected by filtering
18 through its fares array. It performs combinability validation at the
19 construction level, for each pricing entity (Gardner ¶ 0103).

20 27. Pricing services can determine if any unpublished agreements
21 correspond to the fares of the selected pricing entity. For each
22 component within the selected pricing entity, the process will
23 match the selected published fare with an unpublished fare. The
24 process will next perform a combinability validation within each
25 construction using the ticket designator as validation criteria. If

1 combinability is passed, the process will call unpublished fare
2 retrieval/validation module to retrieve and validate the
3 unpublished rules. FIG. 7b illustrates the processing flow of
4 pricing services driver (Gardner ¶ 0104).

5 *Facts Related To The Level Of Skill In The Art*

6 28. Neither the Examiner nor the Appellant has addressed the level
7 of ordinary skill in the pertinent arts of tracking items and data
8 formatting. We will therefore consider the cited prior art as
9 representative of the level of ordinary skill in the art. *See Okajima*
10 *v. Bourdeau*, 261 F.3d 1350, 1355 (Fed. Cir. 2001) (“[T]he
11 absence of specific findings on the level of skill in the art does not
12 give rise to reversible error ‘where the prior art itself reflects an
13 appropriate level and a need for testimony is not shown’”)
14 (quoting *Litton Indus. Prods., Inc. v. Solid State Sys. Corp.*, 755
15 F.2d 158, 163 (Fed. Cir. 1985).

16 *Facts Related To Secondary Considerations*

17 29. There is no evidence on record of secondary considerations of
18 non-obviousness for our consideration.

19 **PRINCIPLES OF LAW**

20 *Claim Construction*

21 During examination of a patent application, pending claims are
22 given their broadest reasonable construction consistent with the
23 specification. *In re Prater*, 415 F.2d 1393, 1404-05 (CCPA 1969); *In*
24 *re Am. Acad. of Sci. Tech Ctr.*, 367 F.3d 1359, 1364 (Fed. Cir. 2004).

1 Limitations appearing in the specification but not recited in the claim
2 are not read into the claim. *E-Pass Techs., Inc. v. 3Com Corp.*, 343 F.3d
3 1364, 1369 (Fed. Cir. 2003) (claims must be interpreted “in view of the
4 specification” without importing limitations from the specification into the
5 claims unnecessarily).

6 Although a patent applicant is entitled to be his or her own
7 lexicographer of patent claim terms, in *ex parte* prosecution it must be
8 within limits. *In re Corr*, 347 F.2d 578, 580 (CCPA 1965). The applicant
9 must do so by placing such definitions in the Specification with sufficient
10 clarity to provide a person of ordinary skill in the art with clear and precise
11 notice of the meaning that is to be construed. *See also In re Paulsen*, 30
12 F.3d 1475, 1480 (Fed. Cir. 1994) (although an inventor is free to define the
13 specific terms used to describe the invention, this must be done with
14 reasonable clarity, deliberateness, and precision; where an inventor chooses
15 to give terms uncommon meanings, the inventor must set out any
16 uncommon definition in some manner within the patent disclosure so as to
17 give one of ordinary skill in the art notice of the change).

18 *Obviousness*

19 A claimed invention is unpatentable if the differences between it and
20 the prior art are “such that the subject matter as a whole would have been
21 obvious at the time the invention was made to a person having ordinary skill
22 in the art.” 35 U.S.C. § 103(a) (2000); *KSR Int’l v. Teleflex Inc.*, 127 S.Ct.
23 1727, 1729-30 (2007); *Graham v. John Deere Co.*, 383 U.S. 1, 13-14
24 (1966).

25 In *Graham*, the Court held that that the obviousness analysis is
26 bottomed on several basic factual inquiries: “[1)] the scope and content of

1 the prior art are to be determined; [(2)] differences between the prior art and
2 the claims at issue are to be ascertained; and [(3)] the level of ordinary skill
3 in the pertinent art resolved.” 383 U.S. at 17. *See also KSR Int’l v. Teleflex*
4 *Inc.*, 127 S.Ct. at 1734. “The combination of familiar elements according to
5 known methods is likely to be obvious when it does no more than yield
6 predictable results.” *KSR*, at 1739.

7 “When a work is available in one field of endeavor, design incentives
8 and other market forces can prompt variations of it, either in the same field
9 or in a different one. If a person of ordinary skill in the art can implement a
10 predictable variation, § 103 likely bars its patentability.” *Id.* at 1740.

11 “For the same reason, if a technique has been used to improve one
12 device, and a person of ordinary skill in the art would recognize that it would
13 improve similar devices in the same way, using the technique is obvious
14 unless its actual application is beyond his or her skill.” *Id.*

15 “Under the correct analysis, any need or problem known in the field
16 of endeavor at the time of invention and addressed by the patent can provide
17 a reason for combining the elements in the manner claimed.” *Id.* at 1742.

18 ANALYSIS

19 *Claims 1-46 and 52-55 rejected under 35 U.S.C. § 103(a) as unpatentable*
20 *over Gardner, Admitted Prior Art, and ATPCO.*

21 *Claims 1, 7, 8, 10, 13, 22, 28, 30, 31, and 34*

22 The Appellant argues claims 1, 7, 8, 10, 13, 22, 28, 30, 31, and 34 as a
23 group.

24 Accordingly, we select claim 1 as representative of the group.
25 37 C.F.R. § 41.37(c)(1)(vii) (2007).

1 The Examiner found that Gardner described the limitations of claim 1
2 except for arbitraries and found that ATPCO described the use of arbitraries
3 to construct the unpublished fares of Gardner. The Examiner implicitly
4 found that one of ordinary skill would have used the air fare construction
5 method of ATPCO to provide improved passenger service and concluded
6 that it would have been obvious to a person of ordinary skill in the art to
7 have applied ATPCO's use of arbitraries and air fare construction to Gardner
8 (Answer 3-5).

9 The Appellant contends that none of the art applied, nor the
10 background in the Specification, describes the preprocessing limitation in
11 claim 1 (Appeal Br. 12:Last full ¶). The Appellant argues that Gardner does
12 not describe fare construction, but merely the accessing of published and
13 unpublished fares (Appeal Br. 13:Second to last ¶). As a result, the
14 Appellant concludes that Gardner's fare components are not directed to the
15 use of arbitraries (Appeal Br. 15:Top ¶). The Appellant further argues that
16 Gardner's published fares do not include travel between gateway and minor
17 cities, because if it did, there would be no need for ATPCO's fare
18 construction (Appeal Br. 13:Last ¶ - 14:First ¶ following the ATPCO
19 extract). The Appellant contends that any combination of APTCO and
20 Gardner would result in a simple cross product of all published fares and
21 arbitraries (Appeal Br. 14:Third from bottom ¶). The Appellant finally
22 argues that Gardner would not incorporate ATPCO's fare construction
23 because Gardner fails to describe any of ATPCO's features (Appeal Br.
24 15:Bottom ¶ - 16:Second ¶).

25 We disagree. Gardner describes the storage of unpublished fares [FF
26 22]. Unpublished fares, by definition, are unpublished. They must be

1 constructed as the combination of an add-on amount and a published fare
2 amount resulting in an amount used in pricing air transportation from one
3 city to another city [FF 15]. Therefore, some preprocessing necessarily
4 occurred in Gardner to create unpublished fares. Whether the preprocessing
5 was performed directly in Gardner's system or indirectly by Gardner relying
6 on ATPCO's fare construction is not pertinent to whether their combination
7 described the limitations of claim 1. Thus, in turn, whether Gardner's fares
8 include arbitraries *per se* is equally irrelevant to the question of whether
9 arbitraries were used in the construction of Gardner's unpublished fares.

10 An add-on fare is an arbitrary [FF 14]. An unpublished fare is the
11 combination of an add-on amount and a published fare [FF 15]. Thus, every
12 unpublished fare stored in Gardner was constructed by the process of step
13 [3] in claim 1. So now the issue becomes whether steps [1] and [2] were
14 predictable to one of ordinary skill in constructing these published fares.

15 ATPCO describes a constructed fare as being the sum of a published
16 fare and an arbitrary [FF 16]. Published fares are fares between cities [FF
17 02]. However, because travel relying on an arbitrary requires that one of the
18 cities in the arbitrary be a gateway city [FF 03], at least one of the cities in
19 each published fare used to create an unpublished fare must be a gateway
20 city. So now we have established that the preprocessing necessarily
21 performed by Gardner must have determined an arbitrary and a published
22 fare that could be added to the arbitrary to create an unpublished fare. Since
23 an arbitrary is an ordered set of a gateway and interior city [FF 03],
24 determining an arbitrary necessarily determines the interior city that appears
25 with the gateway city in an arbitrary for an airline. Thus we establish that

1 the preprocessing to create Gardner's unpublished fare list must have
2 included step [1] of claim 1.

3 So now the remaining issue is whether one would have searched for a
4 gateway city corresponding to a given arbitrary to look up a published fare.
5 Again, an unpublished fare is the sum of an arbitrary and a published fare
6 [FF 16] and one gateway city must be common between the arbitrary and
7 published fare [FF 17]. Having determined the interior and one gateway city
8 from the arbitrary, it is required that the published fare include the same
9 gateway city as in the arbitrary. The only way to ensure this is by restricting
10 the domain of published fares to those having this gateway. So now the only
11 issue is whether the published fares are searched.

12 The Appellant argues, *supra*, that searching is not required because
13 the fares may be determined by a cross product. But this merely glosses
14 over the simple fact that a cross product computation itself requires a search
15 for the operands of each term in the cross product. The fact that a given
16 arbitrary may only be combined with a subset of published fares necessarily
17 requires searching among the published fares for those that may be
18 combined. The Appellant argues that there are no teachings of constructing
19 a database of gateways based on interior cities appearing in arbitraries
20 (Reply Br. 4:Second ¶). We find this argument is not commensurate with
21 the scope of the claim. Claim 1 only requires that a data base is searched for
22 gateway cities corresponding to determined interior cities appearing in
23 arbitraries. This limitation says nothing regarding how such a database is
24 constructed. However, the requirement for a published fare for a gateway
25 city matching the gateway city in the now determined arbitrary necessitates
26 that the database having such a fare exist.

1 Further, we find that whether a search occurs in a cross product
2 computation or a more direct computation does not negate this basic
3 requirement. The Appellant makes no contention that a cross product
4 computation would not involve such a search, but merely contends that a
5 cross product would compute millions of fares (Appeal Br. 10:Last full ¶).
6 Thus, we conclude that step [2] of claim 1 is performed in the preprocessing
7 to create Gardner's unpublished fares table.

8 We therefore find that all three steps of claim 1 are necessarily
9 performed by the combination of Gardner and ATPCO, and the Appellant
10 has not sustained its burden of showing error in the Examiner's rejection of
11 claims 1, 7, 8, 10, 13, 22, 28, 30, 31, and 34.

12 *Claims 2-6, 21, 23-27, and 42*

13 The Appellant argues claims 2 and 23 as a group; 3 and 24 as a group;
14 4-6 and 25-27 as a group; and 21 and 42 as a group. Accordingly, we select
15 claims 2, 3, 4, and 21 as representatives of these groups.

16 Claim 2 further requires accessing a hash table indexed by an airline,
17 interior-city pair to return a list of gateway cities for which an airline has
18 arbitraries that specify the interior city.

19 The Examiner found that Gardner described this (Answer 7). The
20 Appellant contends that neither Gardner nor ATPCO describe either a hash
21 table or the required indexes (Appeal Br. 7-8). The Examiner responds that
22 the only requirement of claim 2 is that a table is accessed (Answer 24). The
23 Examiner further found that Gardner's searching of databases disclosed a
24 hash table (Answer 24). The Appellant responds in turn that claim 2
25 requires both a hash table and certain indexes (Reply Br. 6-7).

1 We agree. It is unclear why the Examiner found that the index and
2 hash table limitations of claim 2 were not required limitations, or why
3 simply searching a database described use of a hash table. However, the use
4 of both indexes and hash tables are step limitations in method claim 2, and
5 the Examiner has erred by not providing prima facie evidence that these
6 limitations are described or suggested by either Gardner or ATPCO. Claims
7 3, 4, and 21 have similar limitations and we therefore find the Examiner has
8 erred with claims 2-6, 21, 23-27, and 42.

9 *Claims 9, 11, 12, 14-20, 29, 32, 33, 35-41, and 43-46*

10 The Appellant argues claims 9 and 29 as a group; 11 and 32 as a
11 group; 12 and 33 as a group; 14, 15, 19, 35, 36, 40, and 43-46 as a group; 16
12 and 37 as a group; 17, 18, 38 and 39 as a group; and 20 and 41 as a group.
13 Accordingly, we select claims 9, 11, 12, 14, 16, 17, and 20 as representatives
14 of these groups.

15 Claim 9 further requires determining if an entry in a construction table
16 was memorized before accessing the construction table; and if the entry was
17 memorized, retrieving an answer from a store of memorized entries. The
18 Examiner found that Gardner described this requirement (Answer 9). The
19 Appellant contends that Gardner does not describe a memorization
20 procedure (Appeal Br. 18:Third ¶). We find this argument is not
21 commensurate with the scope of claim 9, which recites no limitation of
22 memorizing, but merely determining whether an entry was memorized.
23 Since all of the data in Gardner's databases [FF 19] are in memory, all such
24 data are determined to have been memorized and are accessed accordingly.

1 Claim 11 further requires determining a second set of interior cities
2 that appear with a second gateway city in the published fare for the airline
3 and applying an arbitrary that extends the published fare to a city from the
4 second set of interior cities to produce a three component constructed fare.
5 The Examiner found that Gardner described this requirement (Answer 9).
6 The Appellant admits that its admitted prior art and ATPCO clearly disclose
7 extending a published fare with an arbitrary (Appeal Br. 19:First full ¶), but
8 contends that neither reference describes determining a second set of interior
9 cities (*id*). We disagree. Since, as the Appellant admits, ATPCO discloses
10 extending a published fare with a second arbitrary [FF 16], that second
11 arbitrary is necessarily determined. In turn, the definition of an arbitrary as
12 an ordered set of a gateway and interior city [FF 03], implies that the
13 determination of an arbitrary thus determines a second set of interior cities
14 that appear with a second gateway city in the published fare for an airline.

15 Claim 12 further performed claim 1 over all determined cities; claim
16 14 applied claim 1 to international fares in its preamble; claim 16 is
17 essentially similar to claim 11; claim 17 essentially combines claims 11 and
18 12; and claim 20 is essentially similar to claim 9. The Examiner found that
19 Gardner and ATPCI described these requirements (Answer 3-9). The
20 Appellant admits that the prior art would publish a list of constructed fares
21 (Appeal Br. 19:Third full ¶), but contends that neither reference would apply
22 this to a determined second set of interior cities (*id*); and that the prior art
23 does not produce international fares (Appeal Br. 20:First ¶). We disagree.
24 Since, as the Appellant admits the prior art would publish a list of all
25 constructed fares [FF 19 & 22], that list necessarily includes all determined
26 cities and includes international fares. As to those claims incorporating

1 features of claims 9 and 11, we make the same findings as we did with
2 claims 9 and 11, *supra*.

3 We therefore find the Appellant has failed to sustain its burden of
4 showing the Examiner erred in rejecting claims 9, 11, 12, 14-20, 29, 32, 33,
5 35-41, and 43-46.

6 *Claims 52-55*

7 The Appellant argues claims 52, 53, and 55 as a group. Accordingly,
8 we select claim 52 as representative of this group.

9 Claim 52 is essentially similar to claim 2. The Examiner found that
10 Gardner and ATPCO described the limitations of claim 52 (Answer 5-7).
11 The Appellant contends that neither reference describes these limitations for
12 the same reasons as in claim 2, and we agree that the references do not
13 describe these limitations, or those of separately argued claim 54, also
14 depending from claim 52, for the same reasons, *supra*.

15 **CONCLUSIONS OF LAW**

16 The Appellant has not sustained its burden of showing that the Examiner
17 erred in rejecting claims claims 1, 7-20, 22, and 28-41, but has sustained its
18 burden of showing that the Examiner erred in rejecting claims 2-6, 21, 23-
19 27, 42, and 52-55 under 35 U.S.C. § 103(a) as unpatentable over the prior
20 art.

21 **NEW GROUND OF REJECTION**

22 The following new ground of rejection is entered pursuant to
23 37 C.F.R. § 41.50(b).

1 Claims 2-6, 21, 23-27, 42, and 52-55 are rejected under
2 35 U.S.C. § 103(a) as unpatentable over Gardner, ATPCO, the admitted
3 prior art, Tremblay, and Wiederhold. We found that Gardner and ATPCO
4 described all of the limitations of these claims, except for searching for cities
5 indexed by those cities using a hash table, *supra*. Those of ordinary skill
6 knew that using such indexes and a hash table would have improved
7 performance for constructing the fares in Garner and ATPCO, as evidenced
8 by Tremblay and Wiederhold.

9 ADDITIONAL FACTS PERTINENT TO THE ISSUES

10 The following additional enumerated Findings of Fact (FF) are
11 believed to be supported by a preponderance of the evidence.

12 *Tremblay*

13 30. Tremblay is a treatise of data structures used for computer
14 programs and accordingly documents portions of what those of
15 ordinary skill in the programming arts knew regarding how to
16 represent the problems they were trying to solve with data
17 structures appropriate to the problem.

18 31. Tremblay describes one data representation that is conceptually
19 simple for representing a graph. This representation is an *edge list*
20 and is a list of each pair of nodes connected by an edge in a graph.
21 In addition to its simplicity, one of ordinary skill knew that an
22 edge list also has the advantage that since it contains only data
23 relating to actual edges in a graph, processing with an edge list
24 avoids processing of vertex pairs unconnected by edges. If the
25 graph is a digraph, i.e., a graph where each edge has a direction,

1 then each directed edge is stored with the origin being the first of
2 the two nodes. This list may be stored as a linked list, in which
3 case each end node would have a link pointing to it, i.e., would be
4 indexed. Further fields could be added about each edge
5 (Tremblay 446).

6 *Wiederhold*

7 32. Wiederhold is a treatise of methods for storing data in files used
8 for computer programs and accordingly documents portions of
9 what those of ordinary skill in the programming arts knew
10 regarding how to store data for the problems they were trying to
11 solve with data structures appropriate to the problem.

12 33. Wiederhold describes the use of hashed files. Hashed files have
13 been used since the earliest disk files. Hash files find frequent use
14 in pricing tables, schedules and name lists, among other uses
15 (Wiederhold 192:¶ 6-1-6).

16 34. The outstanding feature of hashed files is that records can be
17 accessed in constant time (Wiederhold 220:¶ 65).

18 First we find that because an airline fare data structure is essentially
19 the same as an airline route structure, but with fares instead of distance, and
20 because an airline route structure is a graph having a node for each origin
21 and destination and an edge for each flight between each source and
22 destination pair, the structure for airline fares used by Gardner and ATPCO
23 are those of graphs. An effective data structure for representing such a
24 graph is an edge list, which is indexed by each origin city [FF 31]. Each
25 edge represents a particular flight and therefore a particular airline. Thus

1 each entry in the edge list would be indexed by the airline and the origin
2 city.

3 Next we find that a hash table is one of the oldest data structures used
4 for disk files and is known to be appropriate for pricing and schedules [FF
5 33]. A hash table is accessed in constant time [FF 34].

6 Thus, one of ordinary skill would have searched pricing and flight
7 schedules by Gardner and ATPCO using hash tables and indexes on airline
8 and origin. The origin would have been an interior city for a flight starting
9 in an interior city (claims 2, 5, 21, 23, 25, 26, 42, 52, 53, 54, and 55) and
10 gateway for a flight connecting to a flight from an interior city (claims 4, 5,
11 21, 25, 42, 54, and 55). The search would have been performed in constant
12 time (claims 3, 6, 24, and 27).

13 DECISION

14 To summarize, our decision is as follows:

- 15 • The rejection of claims 1, 7-20, 22, and 28-41 under 35 U.S.C. §
16 103(a) as unpatentable over Gardner, Admitted Prior Art, and ATPCO
17 is sustained.
- 18 • The rejection of claims 2-6, 21, 23-27, 42, and 52-55 under 35 U.S.C.
19 § 103(a) as unpatentable over Gardner, Admitted Prior Art, and
20 ATPCO is not sustained.
- 21 • The following new grounds of rejection is entered pursuant to 37
22 C.F.R. § 41.50(b).

- 1 o Claims 2-6, 21, 23-27, 42, and 52-55 are rejected under 35
2 U.S.C. § 103(a) as unpatentable over Gardner, ATPCO, the
3 admitted prior art, Tremblay, and Wiederhold.

4 Regarding the affirmed rejection(s), 37 C.F.R. § 41.52(a)(1) provides
5 "Appellant may file a single request for rehearing within two months from
6 the date of the original decision of the Board."

7 In addition to affirming the Examiner's rejection(s) of one or more
8 claims, this decision contains new grounds of rejection pursuant to 37 C.F.R.
9 § 41.50(b). 37 C.F.R. § 41.50(b) provides "[a] new ground of rejection
10 pursuant to this paragraph shall not be considered final for judicial review."

11 37 C.F.R. § 41.50(b) also provides that the Appellant, WITHIN TWO
12 MONTHS FROM THE DATE OF THE DECISION, must exercise one of
13 the following two options with respect to the new ground of rejection to
14 avoid termination of the appeal as to the rejected claims:

15 (1) Reopen prosecution. Submit an appropriate amendment of
16 the claims so rejected or new evidence relating to the claims so
17 rejected, or both, and have the matter reconsidered by the examiner, in
18 which event the proceeding will be remanded to the examiner

19 (2) Request rehearing. Request that the proceeding be reheard
20 under § 41.52 by the Board upon the same record

21
22 Should the Appellant elect to prosecute further before the Examiner
23 pursuant to 37 C.F.R. § 41.50(b)(1), in order to preserve the right to seek
24 review under 35 U.S.C. §§ 141 or 145 with respect to the affirmed rejection,
25 the effective date of the affirmance is deferred until conclusion of the
26 prosecution before the examiner unless, as a mere incident to the limited
27 prosecution, the affirmed rejection is overcome.

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1 If the Appellant elects prosecution before the examiner and this does
2 not result in allowance of the application, abandonment or a second appeal,
3 this case should be returned to the Board of Patent Appeals and Interferences
4 for final action on the affirmed rejection, including any timely request for
5 rehearing thereof. No time period for taking any subsequent action in
6 connection with this appeal may be extended under 37 C.F.R. §
7 1.136(a)(1)(iv) (2007).

8 AFFIRMED-IN-PART; 37 CFR § 41.50(b)

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22 FISH & RICHARDSON PC
23 P.O. BOX 1022
24 MINNEAPOLIS, MN 55440-1022

25

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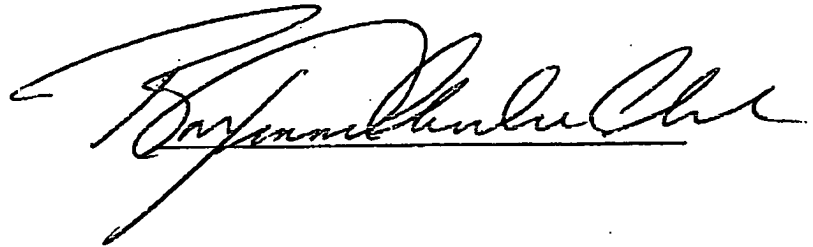
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THE APPELLANT were served as follows:

Ms. Shannon M. Hansen
Mr. William LaMarca
Office of the Solicitor
600 Dulany Street
Madison West – Room 08C43
Alexandria, Virginia 22314

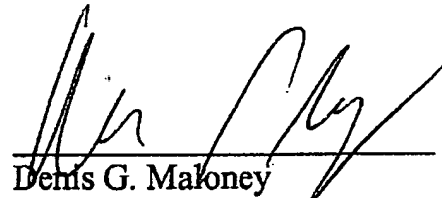
Attorneys for the United States Patent
and Trademark Office

(VIA FEDEX)



CERTIFICATE OF COMPLIANCE

The brief for the plaintiff-appellant complies with the type-volume limitation set forth in Fed. R. App. P. 32(a)(7)(B). The relevant portions of the brief, including all footnotes, contain 8,559 words, as determined by Microsoft Word® 2003.

A handwritten signature in black ink, appearing to read "Denis G. Maloney", is written over a horizontal line.

Denis G. Maloney
Fish & Richardson P.C.
225 Franklin Street
Boston, MA 02110
Tel: (617) 542-5070

Attorney for Appellant
David M. Baggett